

Chemo-Physical Principles of Environmental Nanotechnology: A Review

Balwan U. Patil¹ and Ganesh B. Akat²

Department of Physics, Kohinoor Arts, Commerce & Science College, Khultabad, Sambhajinagar¹
Department of Chemistry, Kohinoor Arts, Commerce & Science College, Khultabad, Chhatrapati Sambhajinagar²
patilbu4@gmail.com

Abstract: *Environmental nanotechnology, an interdisciplinary field at the intersection of chemistry, physics, materials science, and environmental science, holds great promise for addressing pressing environmental challenges and advancing sustainable development. This review article provides a comprehensive overview of the chemo-physical principles underlying environmental nanotechnology and discusses their applications in pollution remediation, water treatment, air purification and environmental monitoring. We begin by introducing the concept of environmental nanotechnology and its significance in mitigating pollution and protecting human health and ecosystems. Subsequently, we delve into the chemo-physical properties of nanomaterials and their interactions with environmental contaminants, including adsorption, degradation, and transformation processes. We then review recent advancements in the synthesis, characterization, and functionalization of nanomaterials for environmental applications, highlighting novel strategies for enhancing their performance and efficiency. Furthermore, we explore the diverse applications of nanomaterials in environmental remediation, including the removal of organic pollutants, heavy metals, and emerging contaminants from soil, water, and air. We also discuss the potential risks and challenges associated with the use of nanomaterials in environmental applications and propose future directions for research and development. By synthesizing and analyzing the latest research in this rapidly evolving field, we aim to elucidate the fundamental principles governing the behavior of nanomaterials in the environment and inspire innovative solutions to address global environmental challenges.*

Keywords: Environmental Nanotechnology, Chemo-Physical Principles, Nanomaterials, Pollution Remediation, Water Treatment, Air Purification, Environmental Monitoring, etc